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HEALTH IN RURAL TANZANIA: THE DETERMINANTS OF HEALTH STATUS, HEALTH CARE DEMAND AND HEALTH CARE CHOICE

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Health in Rural Tanzania: The Determinants of Health Status, Health Care Demand and Health Care Choice

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Abstract

In Tanzania, health statistics have shown slow improvement, although spending on health services in Tanzania is quite high. Defining the determinants of both health status and health use is interesting to point out possibilities for policy. Using household data of the rural Tanzanian mainland, one indicator of health status, the incidence of illness, is examined here and three health demand variables, the incidence of treatment, the level and the provider of treatment. For health outcome as well as health demand, the importance of household income in Tanzania is striking. A positive cross-effect of education on health could not be identified, except for rich Tanzanians. Distance to the nearest health facility does not matter for the poorest patients. Although the measurement of quality is problematic, the quality of the lower level medical care is found to have a positive impact on health status and on health demand, more specifically the nonwage component of quality. These results indicate that the introduction of cost recovery schemes in the Tanzanian health system may have perverse effects, if not combined with a price differentiation according to income and an improvement of quality of health facilities.

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1. Introduction: Health outcomes and health sector in Tanzania

Tanzania is one of the poorest countries in the world, with an economy heavily dependent on agriculture. The World Bank finds that in 1991, 51 % of the population had incomes of less than an absolute poverty line of $1 per day per person. The country has gone through some important economic and political changes during the last decade. Since 1984, structural adjustment programmes started running under pressure of the IMF and the major donors. One possible consequence of the fiscal restraint introduced by the structural adjustment programmes may have been a deterioration of public services, like the education and health sector (Tanzania The Challenge of Reforms: Growth, Incomes and Welfare, 1996).

Demographic and health indicators[1] in Tanzania have been poor and have shown only slow improvement over the years, while the demand for health care is on the rise. Mortality and morbidity levels in Tanzania are quite high. Life expectancy at birth, for instance, is only 50 years. In the Demographic Health Survey of 1991-1992, indicators of malnutrition suggested that 19.8 % of the children under five years old were severely stunted, 46.7 % moderately stunted. Infant and child mortality rates are high[2], but within the range expected, given the country's low income level, and consistent with those in the Sub-Saharan African region. Nevertheless, reductions in outcomes have been slow in coming, compared with the income growth that started in the mid-1980s. Population growth and diseases like AIDS are some of the reasons why demand for health care is increasing in Tanzania. AIDS places large burdens on the curative health system and threatens to reverse the progress made in health statistics.

There appears to be a problem on the supply side of the health sector. Tanzania has a mainly publicly-funded health system, directed towards primary health care in rural areas. The Tanzanian government has built a vast network of health services, with donor assistance, following the administrative levels of the central-local government structure; dispensaries close to villages, rural health centres, and hospitals (district, regional and

[1] For more details, look at Table 4 in Appendix II.

[2] According to the Demographic Health Survey, 92 of every 1000 children die before the age of one. The Sub-Saharan average is 99 to 1000.

consultant hospitals) in towns and large cities[3]. The extensive network of health facilities has led to better access, since distances to health care centers have been shortened. The health system is heavily subsidised[4], but health resources are concentrated at the hospital level and for curative services, even though lower level care and prevention is officially seen as a priority. Unfortunately, it is not clear that higher spending has been translated into better performance of the health care system. The basic rural health services function poorly due to lack of drugs, inadequate salaries for personnel and poor maintenance of government health facilities. Patients will typically bypass lower-level health facilities in favour of hospitals, to receive high quality care (Tanzania Social Sector Review, 1995). Since the beginning of the 1990s, expanding demand for services and declining service quality has led to the re-legalisation of the private sector and the introduction of user fees or cost-sharing in the public facilities.

In conclusion, the spending on health services in Tanzania is quite high, yet the impact on the actual health situation has been small. Although a large infrastructure is available, the quality of health services is declining at all levels and investments in the distribution system of drugs and in personnel are necessary. The implementation of user fees and cost sharing and the privatisation of health care can alleviate the burden of the government, but careful targeting of the poor will be necessary. In this paper, I will look at the effect on health outcome and health use of factors such as household income, distance to the closest health infrastructure and quality of that infrastructure.

Defining the determinants of both health status and health use is interesting to point out possibilities for policy. Public spending on health is obviously a candidate. The question here is whether government expenditures are associated with health outcomes and demand, after controlling for the socio-economic factors that normally influence the latter, such as

[3] At the national level there are four major referral hospitals in major towns and urban areas, one of which is the university teaching hospital. Most regions have a regional hospital and there are a total of 170 hospitals in 106 districts. At the divisional level there are about 276 rural health centres and at the ward level there are about 3014 dispensaries. At the village level, there are village health posts staffed by two village health workers. It is estimated that there are currently around 5550 village health workers in the country. This is about 1 village health worker per 5000 inhabitants.

[4] The approximate health expenditures share of GDP was 2.4 % in 1993/94, making up 8 % of total government spending from 1989/90 to 1992/93 (these are favourable shares compared to other developing countries: according to the latest UNDP figures, Tanzanian public expenditures on health are 3.2 % of GDP, while only 2.5 % for all Sub-Saharan Africa and 1.8 for the Least Developed Countries). Development expenditures accounted for 29 % of total sector spending (in 1993/94), mostly coming from large donors.

household wealth, education, family size... The latest development in this field of research is to account not only for quantity, but also for the quality of health (Alderman and Lavy, 1996). The methodology followed here to investigate the effects on health will be regression analysis. We will estimate the reduced-form demand relation for health inputs and outcomes, using (shadow)prices, income, individual and household characteristics as explanatory variables.

2. Theoretical model

As a theoretical framework to study health, the household model is used. For the standard formulation of the health demand model, we refer to Behrman and Deolalikar (1988) and Strauss and Duncan (1995). To include household decisions regarding human capital, like education and health, the model requires some modification. Let U be household utility defined by:

(1) $U = U (C, H, E; \xi)$, the household utility function

$C = C_a + C_m + C_l$
C_a = household consumption of home produced commodities
C_m = household consumption of market purchased commodities
C_l = household leisure time
H = vector of health of household members
E = vector of education of household members
ξ = household characteristics, taste norms

This household utility function is subject to the agricultural production function, the time and budget constraints[5], but also to constraints directly related to health, like the health production function of the individual:

(2) $H^i = H (N^i, C, I , E^i, E^k, T^i_{H,} T^k_{H,} R^i, \eta^i , \Omega)$, the health production function

H^i = health of individual I with i = 1, …, I
I = number of individuals in household, household size
N^i = nutrient intake of individual i
E^i = education of individual i
E^k = education of key person(s) in household for health
T^i_H = time devoted to health by individual i
T^k_H = time devoted to health by key person(s) in household for health
R^i = use of health related services in community by individual i
η^i = health make-up of individual i

[5] For the details of the standard formulation of these constraints, we refer again to Behrman and Deolalikar (1988) and Strauss and Duncan (1995).

Ω = community characteristics

The use of health infrastructure, R^i, is an endogenous variable dependent on income, education, tastes etc. On the other hand, community availability of health (related) infrastructure is an exogenous covariate, that can be rationed, both in terms of quantity and quality. To determine health status, health care demand and health care choice, the fully reduced form is estimated. Deduced form demand equations are obtained by maximizing equation (1) subject to (2) and the common production, time and income constraints.

Corresponding to this theoretical framework, H^i, as health status, and R^i, as health care demand and choice of health care type, will be analysed in this paper as functions of household characteristics and the features of health care supply in Tanzania. Special attention will be given to the role of the household income, the availability and the quality of health services as determinants of outcome of health and demand for health care.

3. Empirical model

The left-hand side variables to be used in the empirical analysis will be binary. For example, we will analyse the factors determining whether someone is ill or whether treatment is sought. The variable observed and to be explained, called y, is a dummy variable, and the probability that it assumes the value 1 will be estimated by the logistic regression representation of the logit model[6], where *e* is the base of the natural logarithms and where P is the linear combination of the independent variables (Liao, 1994):

$$\left[\text{Prob}(y=1)/1-\text{Prob}(y=1)\right] = e^{\left(\sum_{k=1}^{K} b_k x_k\right)} \text{ or } \text{Prob(y = 1)} = e^P/1+e^P \text{ and P} = \sum_{k=1}^{K} b_k x_k$$

The parameters b_k of the model are estimated using the maximum-likelihood method.

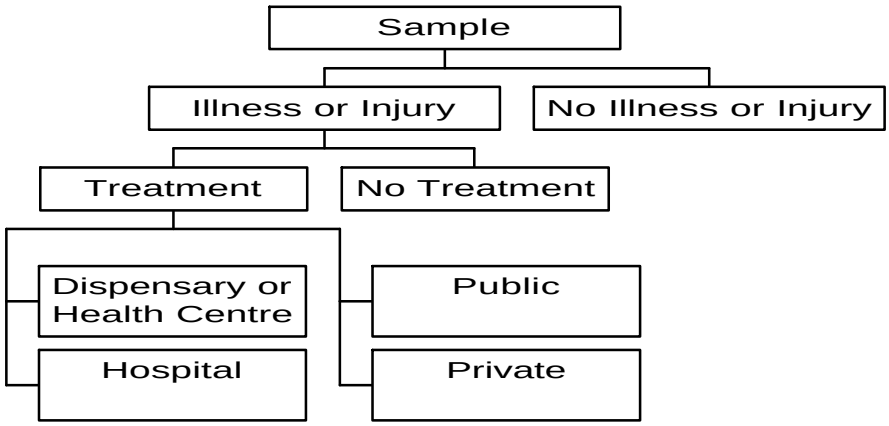
To find the marginal effect of a change in one explanatory variable on the probability of the event happening (while all other independent variables are held constant at their sample averages), the change-in-probability method is used, calculating the difference of the predicted probabilities with and without the change, instead of the usual partial derivative of that probability with respect to the i-th independent variable (Liao, 1994). Marginal

[6] Jianghui, Suhua and Lucas (1997) also use the logistic regression model to analyse morbidity and outpatient service utilisation in poor rural China.

effects for a one unit or a 10 % change in the independent variables are calculated. When the changing explanatory variable is a dummy, the probability conditional on each of the two categories in the dummy is compared.

The way that health is modelled can lead to some bias problems. Take a look at the stages of sampling in Figure 1.

Figure 1: Curative Health Care Modelling



The mere fact of using self-reported survey data induces the mortality selection bias and the self-reporting bias. Very unhealthy people are not included in samples, while those included in the sample typically will report more health problems when they are rich and well-educated. The positive relationship between a higher education or a higher socio-economic status and a higher probability of reporting incidence of illness has been established in many studies (Behrman and Deolalikar 1988, Strauss and Thomas, 1995).

The tree structure of the model causes a sample selection bias. It can be argued that the subsamples in the different stages are not random anymore. Unobservables (e.g. severity of illness) that influence the first stage (falling ill) can also be correlated with those influencing the second and third stage (searching treatment and choosing the kind of treatment). In the literature, no consensus has been reached on the question whether this is a substantial problem and how to solve it[7]. Authors who accounted for the correlation between disturbance terms, found correction terms insignificant (Lavy and Guigley (1993) for Ghana, Appleton (1995) for Kenya, Dow (1996) for Côte d'Ivoire).

[7] In appendix VI, we tried one way of dealing with the bias problems: restructuring the sample.

Here, a sequential approach to modelling health is followed, because the self-reporting bias will distort the identification of correction terms and the set of explanatory variables is not exactly the same in each stage. As dependent variables, dichotomous variables are used for a practical and theoretical reason. Constructing more than two alternatives would lead to some empty categories. Furthermore, the assumption of independence of irrelevant alternatives necessary for a multinomial logit could be hard to maintain when discussing level and provider of treatment.

In the next section, the Tanzanian sample and the construction of dependent and independent variables will be discussed.

4. Data set and variables

For this study, data of the Tanzania Human Resource Development Survey[8] were supplemented by government data on recurrent government expenditures on health centres and dispensaries on the district level[9]. Taking only the rural districts gives us a data set of 2479 rural households (with 15128 individuals).

The health outcome as defined in the model above is not directly observed. One possibility is to use self-reported indicators, such as reports of ill-health and its duration, with all the problems of recall errors and of a possible self-reporting bias[10] this entails. Unfortunately, the nature of the information on health in the survey leaves us no other choice than to use these self-reported measures.

The demand for health care as a dependent variable, the inputs into the health production process (not measures of health outcome itself), can be measured as the incidence of treatment and the type of treatment (the choice between modern or traditional, public or private, preventive or curative health care, dispensary or hospital, etc.). Health care inputs, such as the presence of water supply and the availability of medical care facilities (distance

[8] The survey was carried out during late 1993 and early 1994 by the Faculty of Economics at the University of Dar es Salaam, the Planning Commission of the Government of Tanzania, and the World Bank and covered 5184 households (with 29914 individuals).
[9] A complete table of government expenditures is given in appendix III.
[10] Cfr. supra p. 9.

and quality) can also enter into the equation as independent variables at the household and community level.

Turning to the variables constructed for the regressions in this paper, descriptive statistics are given in Table 1. As dependent variable for health outcome, a proxy for health H^i in the theoretical model, a dummy "incidence of illness or injury" was constructed. In the survey, the question on this was asked for the last four weeks. As for the health care demand proxies, to measure the input R_i in the health production function of the theoretical model, a dummy for "incidence of treatment" and two dummies for "type of treatment" were used[11]. A distinction was made between the level of treatment: dispensaries and health centres being the lowest level of health care in Tanzania and hospitals the highest level. Another distinction for type of treatment was made as to the provider of treatment, being either a government health facility or the less spread private providers.

Variables of the individual, household and community level were entered as explanatory factors. At the individual level, age and sex were included. The sex dummy is entered to investigate the gender differentials in human capital investments and outcomes found in many developing countries (Strauss and Thomas, 1995). At the household level, a number of variables indicating the household structure were used: the proportion of female adults, of boys and girls (younger than 15 years) in the household. Next to these, a few characteristics of the household head are given: the age and gender of the head and a dummy for his or her completion of primary education[12]. Sex of the head is also entered, to test whether female-headed households are better-off in health matters. Finally, a proxy for wealth of the household had to be constructed. In this case, the consumption expenditures in Tanzanian shillings per month per person in the household are used[13].

As for community level variables, some measures of service availability and quality are included. Here, the distance to the nearest health facility, expressed in kilometres, has been used. This measure should be considered as the opportunity cost for an ill or injured individual to visit a health care facility. Of course, estimated impacts of service availability

[11] Data on treatment are only available for those with illness or injury. Not all those with illness or injury have answered the questions about seeking treatment and what kind of treatment.
[12] Since half of the persons in the sample had no education at all, the threshold is set at the final year of primary education.

can be biased if service quality is not also measured. People can travel beyond the closest health care facility, due to important quality differences in facilities, especially in Tanzania (Tanzania Social Sector Review, 1995).

Table 1: Descriptive statistics of variables

Variable name	Mean	Standard deviation	Frequencies of dummies		
DEPENDENT VARIABLES					
Health status			0	1	total
illness/injury last 4 weeks (yes=1)	0.1	0.4	12956	2221	15177
Health use					
treatment (yes=1)	0.7	0.5	752	1466	2218
disp/hc or hospital treatment (hospital=1)	0.3	0.5	929	375	1304
public or private treatment (private=1)	0.4	0.5	901	549	1450
EXPLANATORY VARIABLES					
Individual					
age	20.5	17.9			
ln(age)	2.6	1.0			
age squared	743.5	1185.2			
ln (age squared)	7.9	5.0			
sex (female=1)	0.5	0.5	7441	7775	15216
Household					
proportion of women in household	0.5	0.2			
proportion of boys in household	0.3	0.2			
proportion of girls in household	0.3	0.2			
age household head	45.6	13.7			
ln (age household head)	3.8	0.3			
sex household head (female=1)	0.1	0.3	13622	1461	15083
primary education head (completed=1)	0.4	0.5	9014	5889	14903
consumption/month/capita	910.8	1602.5			
ln (consumption/month/capita)	6.1	1.1			
Community					
distance dispensary/health centre	6.1	28.1			
distance hospital	31.7	32.7			
distance private health facility	19.7	32.6			
distance public health facility	5.9	10.3			
total government disp/hc expenditures	3840355	1334470			
ln (total government disp/hc expenditures)	15.1	0.3			
wage government expenditures	2298838.6	840225.0			
ln (wage government expenditures)	14.6	0.3			
non-wage government expenditures	1541516.5	631777.0			
ln (non-wage government expenditures)	14.2	0.3			
% of non-wage in total	0.4	0.1			

Note: Total number of individuals in rural areas in survey is 15218.

Measuring quality is quite problematic, since supply side as well as demand side considerations are mixed and since the relation between quality, on the one hand, and illness or health care demand, on the other hand, should be negative (Alderman and Lavy, 1996). To proxy quality, sometimes very crude density measures, such as the number of

[13] As the survey data on consumption were not correctly collected, it was not possible to account for consumption of agricultural home production, so only purchased consumption is used here.

local doctors per capita in the community, are used (Strauss and Thomas, 1995). A number of authors use expenditure data. Deolalikar (1995) uses recurrent government health expenditures per capita of a province in Indonesia and considers it to proxy availability as well as quality of health facilities. Akin, Guilkey and Denton use expenditure on care per person in the population as a quality measure for Nigeria (Alderman and Lavy, 1996). In our regressions, the quality[14] of health care in dispensaries and health centres is measured by the recurrent[15] government expenditures in Tanzanian shillings per dispensary or health centre of the district[16]. For these budgets, the share of expenditures[17] spent on wages of personnel and non-wage items (medicines, food, utensils, driving vehicles etc.) are known, the first being a proxy for quality in terms of staff and the second for quality in terms of availability of equipment and drugs[18].

Unfortunately, these budgets are just averages per primary health facility in a district, which involves the risk of inaccuracy. Under ideal circumstances, the data of the household survey should complemented by a full survey on the characteristics of the health facility. Since we lack such provider survey data, an approximation of quality will have to be used. As already mentioned, high government expenditures have not lead to better quality on the national level. This does not have to be contradictory to the use of expenditures as a quality measure, since the budgets used here are only those for rural areas and only for primary health care. In the national budget, the distribution of expenditures is skewed to the urban areas and to hospital care (Tanzania Social Sector Review, 1995).

To differentiate the effect of some independent variables in the behavioural response of the poor and the rich, some interaction terms were added: schooling of the household head, consumption and the distance to a health facility were interacted with a dummy for being

[14] The HRDS data also include questions on the subjectively perceived quality of each public facility (school or health clinic). Nayaran and Pritchett (1996) state that a quality index could be constructed with these data, but raise some questions about reliability or interpretation of the rankings.

[15] Only recurrent costs were known, no account was made for capital costs, which may lead to a bias. The numerous budgetary sources for the sector, of different administrative levels, as well as foreign funds, make the reconstruction of the developmental or recurrent and actual or budgeted expenditure a very complex task.

[16] Government expenditures are expressed per dispensary or health centre in the district and not per capita, to exclude the effect of population density, since the distance to a health facility is already indicative of population density.

[17] In appendix III, Table 5 gives the expenditures per rural district.

[18] When entering these two budget variables, the wage and the non-wage budget, multicollinearity became a problem of a serious degree. Replacing them by the total budget and the percentage of the non-wage in

poor[19]. Since half of the Tanzanian population can be considered to be poor according to World Bank standards, the sample was divided into poor and rich, the dummy being equal to one for those belonging to the group that consumes less than the total sample population median consumption[20].

5. Empirical results

5.1. Frequencies

In the sample of rural individuals, almost 15 % of the people had suffered from illness or injury during the last 4 weeks prior to the survey[21] (Table 2). Of those 15 % ill or injured, 66 % sought care. This number is in line with findings in neighbouring countries of Tanzania[22]. Women and older people are more likely to report illness, but they are less likely to seek treatment. Households with an illiterate head report less illness and seek less care. Across the welfare groups, the differences become even more explicit. The poorest quartile of households were almost half as likely as the richest quartile to report illness (12 versus 21 %). The poorest are also less likely to seek care than the richest (61 % versus 74 %)[23].

Clearly, the problem of the self-reporting bias arises for the data on incidence of illness. Appleton explains that measures of self-reported morbidity may not indicate the differences

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the total budget reduced correlation from 0.6 to 0.1 and kept the information given by these variables intact.

[19] The likelihood ratio test showed that the model with 3 interaction terms is significantly different from a model without any interaction terms at all. This justifies the inclusion of the interaction terms. The likelihood ratio test also showed that the model with 3 interaction terms is not significantly different from a model where an interaction term is included for every variable. This justifies why only these 3 interaction terms are included.

[20] For instance, this means that the coefficient of the consumption variable gives the effect on illness or treatment, for both the rich and the poor, while the interaction term coefficient explicates the extra effect for the poor only. To find the total effect for the poor, both coefficients should be added. Or, in mathematical terms, $\sum_{k=1}^{K} b_k x_k + e = \ldots + \beta_i X_i + \beta_i^* X_i^P + \ldots = \ldots + \beta_i X_i^R + (\beta_i + \beta_i^*) X_i^P + \ldots$

if $X_i = X_i^R + X_i^P$ in which X are data matrices, R refers to the rich and P to the poor.

[21] For comparison, Deolalikar (1995) looks at the reporting of illness in Indonesia, but then during the last week, finding 11 % ill. Dercon (1996) investigates Ethiopian panel data and finds an average of 16 % ill the last 4 weeks. Lavy and Germain find 36 % ill the last thirty days in their Ghanaian sample.

[22] For rural Ethiopia it is about 55 %, for Kenya close to 70 %, for Uganda close to 90 % (Dercon, 1996), for Ghana 44 % (Lavy and Quigley, 1993).

[23] The same phenomenon was found in rural Ethiopia, but the difference between the poor and the rich quartile not so big: 52 % of the poor sought treatment versus 59 % of the rich (Dercon, 1996).

in illness itself, but rather reflect the differences in sensitivity to illness, whether real or illusory (Appleton, 1995). This would mean for Tanzania that the rich are not necessarily more in ill-health, but they report more illness, since they are better informed about the causes and symptoms of diseases. Little can be done to eliminate the self-reporting bias completely, except control for the variables it is related to, like education, experience and welfare.

To explain why a particular level or provider of care was chosen two distinctions were made. A first distinction is the level: whether the sick go to primary (dispensaries and health centres) or secondary health care (district, regional or major referral hospitals). Although the health system is designed to function on the basis of referrals from the lowest service up, the sick tend to go directly to the highest accessible tier, where quality of both staff and equipment can be expected to be better, if one can afford the higher prices[24] to be paid in hospitals. Analysis of the pattern of the use of services by provider is important in designing the government's own investments as well in designing policies that govern the activities of the private sector (Bedri Kello and Abraha, 1997). The private sector is known to have better drugs supplies system and to possess better equipment and infrastructure. But the public sector is more subsidised and has more qualified personnel.

In our sample, 71 % of the treated ill choose basic health care (Table 2). This means that almost 30 % of the rural inhabitants go directly to a hospital for the first treatment of their ailment. When looking at the choice of providers of health care, either public (governmental) or private (missions, for-profit practitioners or employer-owned establishments), 62 % of those sick and seeking treatment go to a government provider[25]. This means almost 40 % of the rural population goes to private health care, although the private sector is not well developed at all in Tanzania and thus at a greater distance[26]. Public basic health care is still the most important branch of the health system.

Across welfare groups, no sharp differences are found for the choice of the level of health care, except for the higher middle quartile of which 36 % go to a hospital. But for the type

[24] Prices are higher due user fees, travelling costs and expenditures on medicines.
[25] For comparison, in rural Ethiopia, 55 % of all ill go to government providers (Dercon, 1996), in urban Ethiopia more than 60 % (Bedri Kello and Abraha, 1997), in Ghana 41 % (Lavy and Germain, 1994).
[26] Cf. the descriptive statistics: the mean distance to the nearest private health facility is 19,7 km, for the nearest public facility 5,9 km.

of provider of health care, across the welfare distribution, a strong divergence is found: 30 % of the poorest quartile seeks treatment in private facilities, against 51 % of the richest. It seems that for the level of health care, people have no choice. Since they live in rural areas, all hospitals are far away. But as regards the use of government-owned or private facilities, the richer income groups do avoid the public sector.

Men frequent hospitals more often, while women seem to visit the private health system slightly more often. Across age groups, the picture is not that clear. Of the older people 33 % goes to hospital, while only 25 % of the children does. Especially people in the productive stage of their life seem to seek care in private health facilities. Education makes a bigger difference for the choice between public and private health care than for the choice between low or high level services: 39.5 % of the people in a family with an educated head visit private health care, 36 % of those without an educated head. This may occur because of shorter waiting times at private health care and the better educated have a higher value of time.

Table 2: Observed frequencies for reporting illness or injury during the last 4 weeks by the rural, for seeking treatment by the rural ill or injured, for level of treatment: primary (dispensary/health centre) or secondary (hospital) health care level and for provider of treatment: public (government) or private (mission etc.) health facility

		people	illness or injury				people	treatment				people ill	level of treatment				people ill	provider of treatment			
			yes		no		ill/injured	yes		no		& treated	hospital		disp/hc		& treated	private		public	
		n°	n°	%	n°	%	n°	n°	%	n°	%	n°	n°	%	n°	%	n°	n°	%	n°	%
Total sample		15177	2221	14.6	12956	85.4	2218	1466	66.1	752	33.9	1304	375	28.8	929	71.2	1450	549	37.9	901	62.1
By gender	Male	7416	987	13.3	6429	86.7	985	660	67.0	325	33.0	579	178	30.7	401	69.3	652	240	36.8	412	63.2
	Female	7759	1234	15.9	6525	84.1	1233	806	65.4	427	34.6	725	197	27.2	528	72.8	798	309	38.7	489	61.3
By age group	Child	7507	1014	13.5	6493	86.5	1013	675	66.6	338	33.4	610	155	25.4	455	74.6	670	243	36.3	427	63.7
	Adult	5209	729	14.0	4480	86.0	728	480	65.9	248	34.1	430	134	31.2	296	68.8	475	190	40.0	285	60.0
	Elderly	2111	477	22.6	1634	77.4	476	310	65.1	166	34.9	264	86	32.6	178	67.4	304	115	37.8	189	62
By welfare group	Poorest quartile	5919	698	11.8	5221	88.2	698	428	61.3	270	38.7	376	99	26.3	277	73.7	422	126	29.9	296	70.1
	Lower middle quartile	4539	629	13.9	3910	86.1	628	415	66.1	213	33.9	374	96	25.7	278	74.3	412	135	32.8	277	67.2
	Higher middle quartile	3114	548	17.6	2566	82.4	547	368	67.3	179	32.7	334	121	36.2	213	63.8	365	162	44.4	203	55.6
	Richest quartile	1602	344	21.5	1258	78.5	343	253	73.8	90	26.2	218	59	27.1	159	72.9	249	126	50.6	123	49.4
By education of head	Educated head	5868	928	15.8	4940	84.2	927	630	68.0	297	32.0	568	163	28.7	405	71.3	626	247	39.5	379	60.5
	Not educated head	9001	1244	13.8	7757	86.2	1242	804	64.7	438	35.3	708	205	29.0	503	71.0	794	285	35.9	509	64.1

Note: Only data of rural Tanzania mainland are included. For age groups: a child has age <= 15, an elderly has age > 40 years. For education of head: if household head has completed primary school or higher, then (s)he is considered educated. For welfare groups: the consumption per capita in the household per month is under 333.92 Tanzanian shilling for 1st quartile, between 333.92 and 794.68 (median) for 2nd quartile between 794.68 and 1865.56 for 3rd quartile, between 1865.56 and 270463.3 (maximum) for 4th quartile.

Table 3: Logistic regression results

Dependent variables	Incidence of illness (1=ill)			Incidence of treatment (1=treated)			Level of treatment (1=hospital)			Provider of treatment (1=private)		
-2 Log Likelihood Restricted Model		11103.5280			2535.9522			1297.227			1437.656	
-2 Log Likelihood Full Model		10579.8060			2485.8520			1106.673			1297.216	
Chi-Square		523.7220			50.1010			190.554			140.441	
Significance Level		0.0000			0.0000			0.000			0.000	
Chow test (no vs. some effects for poor)	12.330	(7.815)		7.271	(7.815)		30.939	(9.488)		20.149	(9.488)	
Chow test (some vs. all effects for poor)	10.635	(18.307)		10.258	(18.307)		13.177	(18.307)		11.084	(18.307)	
Independent variables	Coefficient	Wald-statistic	Sig	Coefficient	Wald-statistic	Sig	Coefficient	Wald-statistic	Sig	Coefficient	Wald-statistic	Sig
ln(age)	-1.358	288.225	**	-0.583	13.330	**	-0.014	0.004		0.391	3.556	+
ln (age squared)	0.305	303.073	**	0.120	12.110	**	0.036	0.522		-0.083	3.200	+
sex (female=1)	0.295	30.533	**	-0.048	0.213		-0.169	1.140		0.321	4.853	*
proportion women household	-0.554	4.067	*	-0.904	3.500	+	-0.336	0.208		0.219	0.105	
proportion boys household	-0.763	13.722	**	-0.556	2.067		0.372	0.417		0.144	0.076	
proportion girls household	-0.291	1.734		0.970	5.717	*	0.444	0.475		-0.748	1.623	
ln (age household head)	-0.004	0.002		-0.217	1.436		0.741	6.421	**	-0.131	0.240	
sex head (female=1)	0.339	15.713	**	0.348	4.299	*	-0.119	0.224		-0.031	0.021	
education head (completed=1)	0.163	3.565	+	-0.037	0.048		0.722	8.705	**	-0.155	0.504	
education head (completed=1)*poor	-0.208	3.750	*	-0.035	0.028		-0.540	2.985	+	0.115	0.168	
ln (consumption/month/capita)	0.229	54.889	**	0.179	8.589	**	-0.177	3.302	+	0.187	4.701	*
ln (consumption/month/capita)*poor	0.002	0.019		-0.021	0.509		0.035	0.542		-0.017	0.157	
distance dispensary/health centre	-0.005	2.370		-0.024	5.326	*	0.071	9.921	**			
distance dispensary/health centre*poor	0.007	4.379	*	0.025	5.836	*	-0.073	10.464	**			
distance hospital							-0.031	28.718	**			
distance hospital*poor							-0.018	4.133	*			
distance private health facility										-0.028	15.004	**
distance private health facility*poor										0.011	1.644	
distance public health facility										0.096	16.645	**
distance public health facility*poor										-0.086	12.070	**
ln (total government disp/hc expenditures)	-0.380	19.422	**	-0.088	0.296		-0.128	0.266		0.436	3.297	+
% of non-wage in total	0.296	0.734		0.740	1.173		-3.716	12.361	**	4.537	22.195	**
constant	3.842	7.320	**	2.279	0.766		1.076	0.072		-9.832	6.337	**

Note: Sig = significance level of: ** = between 0 and 1 %, * = between 1 and 5 % and + = between 5 and 10 %. The first Chow test checks if a model without any interaction terms for the poor is equal to the model actually used with poverty dummies included for some variables. If the likelihood ratio exceeds the critical Chi-square value between brackets, the null hypothesis of equality is rejected. The second Chow test does the same for the model actually used and a model with interaction terms for all variables.

5.2. Regression results

Let us now turn to the regression results. For the incidence of illness, the dummy used assumes a value of 0 for the healthy and a value of 1 for the ill. For the incidence of treatment, it is 0 for not treated and 1 for treated. For the type of treatment, the dummy is 1 when going to hospital instead of a dispensary or health centre and 1 when going to the private instead of public sector. The results of running the logistic regressions are given in Table 3.

First, the chi square statistics indicate that the full model (containing all independent variables) is significantly different from the reduced model (with only an intercept term) for all four regressions. Secondly, two Chow tests were performed to check the stability of the regression coefficients, in this case to check whether the coefficients of the subsamples for the poor and the rich were constant. Basically, this procedure was done to confine the number of interaction terms consisting of variables and the dummy for the poor. For the four cases, the model with a limited number of interaction terms is preferred over a model including all possible interaction terms. Thirdly, to test whether the coefficient of each variable separately is zero, a Wald statistic, following a chi square distribution is being used[27]. To interpret the parameters shown to be significantly different from zero by the Wald test, one has to keep in mind that the left-hand side consists of an odds ratio, the probability of the event occurring (e.g. reporting ill) over the probability of the event not occurring[28]. This means that if a significant coefficient β_i is positive (negative), the factor by which the odds change when X_i increases with one unit, $e^{\beta i}$, is larger (smaller) than one, so this is increasing (decreasing) the odds.

Some patterns emerge. Falling ill and seeking treatment is related to individual and household characteristics. For the type of treatment (its level as well as its provider), the most significant variables are community characteristics. We will discuss some of the independent variables in more detail.

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[27] $Z^2 = \left[\hat{b}_i \big/ s_{\hat{b}_i} \right]^2 \rightarrow c^2(1)$

A clear gender bias in terms of women falling more ill and having less access to care is not found in Tanzania. Women report significantly more illness. When the individual is a woman, her probability to report an illness is 3 % higher than for a man (his probability being 0.114 and hers 0.147). Either women are really unhealthy in Tanzania (which would not be surprising considering high maternal mortality rates) and/or they are better informed on health risks (thanks to health campaigns). But women do not seek significantly more or less treatment, compared to men. If women seek care, they go more to the private sector. Being a female patient increases the probability of visiting a private sector health facility by 7 %. Probably, women go more to the private sector, because the latter provides more maternal and child health services. For the level of care (primary health care or hospitals) no significant discrimination was found.

A kind of 'female autonomy effect' can be observed. When the sex of the household head is considered, the probability for reporting illness in a female-headed household is 4 % higher than for the male-headed (a probability of 0.169 versus 0.127). The probability of seeking treatment is 8 % higher (from 0.604 to 0.684). Women can let their higher awareness about health and illness matters pay off in the form of more likely treatment of diseases, if they are in a more powerful position.

A completed primary education of the household head only pays off for the rich in their recognition of diseases and their decision to go to hospital. For individuals who are less better-off, the education effect is not that large in health matters. For the poor the positive effect of education on reporting illness is turned negative (0.163 - 0.208 = - 0.045). The effect of education on choosing a hospital is partly eliminated (0.722 - 0.540 = 0.182) for the poor. In choosing the level of health care, poor educated people do not really seem to have an option due to the more expensive treatment at hospitals. For the type of provider, public or private, a difference between literate and illiterate or between the rich and the poor for education does not come out as significant. In general, returns to education in areas having traditional agriculture are low (Strauss and Thomas, 1995). Probably, in health matters, education starts playing only in the form of access to information, as Mackinnon (1995) argues for child health outcomes Uganda. This means investing more in

[28] $\left[\text{Prob}(y=1)/1-\text{Prob}(y=1)\right] = e^{\left(\sum_{k=1}^{K} b_k x_k\right)} = \prod_{k=1}^{K} e^{b_k x_k}$

education may not have the positive cross-effect on health which is usually assumed[29]. School enrolment rates are very low in rural Tanzania. Half of the sample had no education at all. Of those who start going to school, only few complete basic education, and even less continue to secondary education. Only rich people obtain benefit from education for their health. Furthermore, Behrman and Deolalikar (1988) claim that education can increase the use of health facilities (which is already high in Tanzania), but this is not always necessarily translated into better health statistics.

Throughout all four regressions, monthly consumption per household member is a decisive determinant of health. Being rich makes you report more illness, seek more care and seek care by private providers. In other studies, response to wealth was not always found (Behrman and Deolalikar 1988, Appleton 1995). The marginal effects of an increase in consumption show that gaining more income has a positive and large effect for the rich, but a small and negative one for the poor, except for the reports of illness. Concerning the treatment for instance, if the Tanzanian richer half of the population gets a 10 % increase in consumption, their chances for seeking cure when ill increase by 2 % (from 0.612 to 0.637). If the poor could consume 10 % more, the probability falls with -0.006 (from 0.612 to 0.606). Richer households tend to utilise private facilities more than poorer families since private facilities are more expensive financially while being less costly in terms of waiting time (Bedri Kello and Abraha 1997). A 10 % increase in consumption has demonstrated again to have an effect of smaller size and with a different sign for the Tanzanian poor compared to the rich. Poor people have other priorities than health to spend their money on, when facing an income increase.

Distance to the nearest health facility has mainly an effect for the treatment of the rural rich, demonstrating their opportunity cost of time spent on health matters, since the rich usually also have a higher education and higher wages in jobs outside the agricultural sector. The further away the closest dispensary or health centre, the smaller the chances of seeking treatment. The further away from the closest dispensary or health centre, the more likely Tanzanian patients will go to hospital. As the distance to closest private facility increases and as the closest government health service is nearer, the less the chances are to go to the private sector. In a similar way, Appleton (1995), Dercon (1996) and Lavy and

[29] Adding an interaction term consisting of education and sex of the household head did not produce a significant effect. So, having an educated female household head does not pay off in health matters.

Germain (1994) find distance to health facilities to affect the take-up of the ill and the choice of health facility in Kenya, Ethiopia and Ghana. But in Tanzania, the distance coefficients become almost zero for the poor. The poor do not consider distance a matter of importance in a decision on treatment or choice of treatment. In other words, the poor have a very low opportunity cost, meaning that the return to work is very low.

Although the measure of quality was only available for dispensaries and health centres, some conclusions can be drawn. Living in a district with high quality basic health care has a positive impact on health status (while living close to a facility has no impact at all for incidence of illness). For the level of treatment chosen, the non-wage component of the quality measures is important. This means quality is more a matter of having a well-equipped facility with medicines in stock, than a matter of staff. This is in line with how Tanzanians themselves evaluate their health system (Tanzania Social Sector Review, 1995). Infrastructure investments in dispensaries and health centres could make people visit these facilities more, with a higher chance of benefits for the poor, since they visit public dispensaries and health centres more frequently.

6. Conclusion and directions for further research

As the Tanzanians say: *"Bora afya kuliko mali"*, a good health is more valuable than wealth. But being wealthy helps to be healthy. The importance of household income and quality of medical care for health status as well as health demand in Tanzania is striking. In a time when the theme of cost recovery is dominating in the health sector, this implies that the implementation of cost sharing and user fees will be difficult in Tanzania, since it may not be feasible for the poor and with the current level of quality of health care. Cost recovery could have perverse effects, if not combined with a price differentiation according to income and an improvement of quality of health facilities.

As transportation time and cost do not deter poor users, the rehabilitation of more centralised health facilities that offer high quality care may be an alternative to the expansion of the number of facilities. A finding confirmed in other poor African countries, like Ethiopia, where Collier, Dercon and Mackinnon (1997) find that household usage of

primary health facilities is far more sensitive to quality than to distance. For Tanzania, direct effects of an increase in basic health service expenditures, and mainly in the nonwage inputs, can be assumed to be favourable to health. Care has to be taken with implementation, though. Nothing is said about the equity of the distribution of government spending (Deolalikar, 1995). Moreover, the positive quality effect of more drugs, utensils and so forth may be offset by the effects of consequent reductions in expenditures on the wages of the employees, by increases in the prices of health service inputs (caused by an increased demand acting on a fixed supply), or by cuts in the budgets of other social services affecting health. As Lavy and Germain (1994) put it, results found indicate what the effect of improving quality could be, not how it is financed.

Since distance does not seem be an issue for the poor, this indicates that the poor do not ignore illness because they cannot afford to lose time, but because they lack the knowledge needed for correct diagnosis. Usually, authors point to the role of education in accumulating knowledge on health. But since the education effect is small for the Tanzanian poor, the problem could be the result of a lack of information in general, like access to the media. It could also be a consequence of a cultural determination of what normal and good health is, which has been corrected by the rich using their education, but not by the poor (Behrman and Deolalikar, 1988). Strauss and Thomas (1995) call this the "information-processing effect". The importance of knowledge and cultural habits is an important finding for choosing policy instruments. The usual remedies proposed to enhance health, e.g. investing in female education as the World Bank advocates, may not necessarily be that effective to reach the Tanzanian poor. Education has only small effects on health in Tanzania; enhancing female autonomy may be more important than educating women. To make people more aware and better informed about health risks in the short run, other channels than education, like public health campaigns, will have to be used.

Cost recovery is definitely a subject for further research, as is the refining of the econometric model. Moreover, the data could be processed for the same issues for comparison of different regions in Tanzania. Also, the survey data leave ample room for further research on child mortality, another form of looking at health status, and preventive health care, which has been neglected somewhat in Tanzania and probably could play a big part in improving health statistics.

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Appendix I: Map of Tanzania

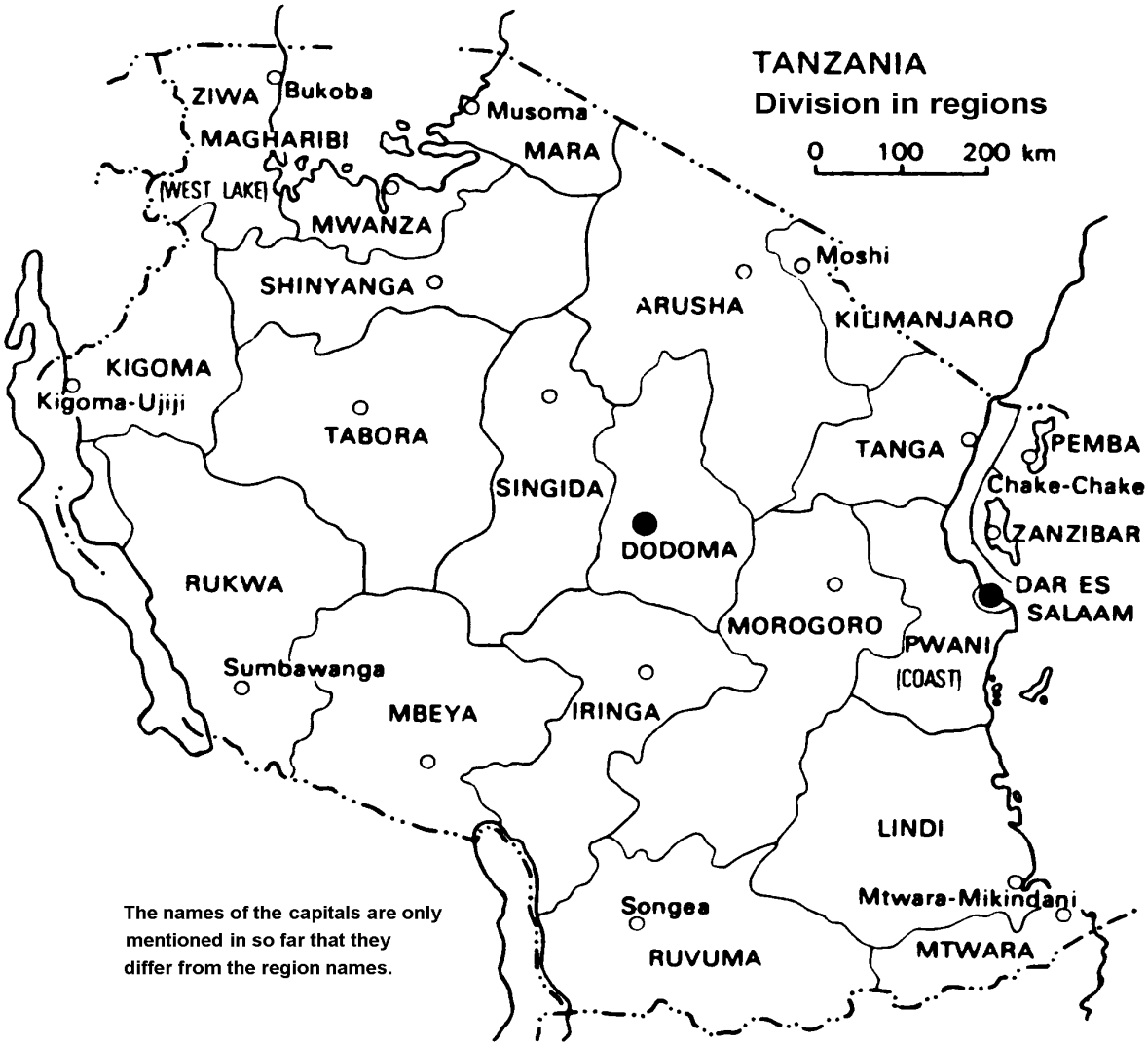

Figure 2: Map of Tanzania regions

Appendix II: The Tanzanian health sector

Table 4: Demographic and health indicators of Tanzania

Indicator	Census 1967	Census 1978	Census 1988	TDHS 1992	MOH 1994	MOH 1996
Total population (millions)	12.3	17.5	23.1			28.4
Male population (millions)						13.8
Female population (millions)						14.6
Population growth rate (%)			2.8			
Density (pop./sq. km)	14.0	20.0	26.0			
Percent urban	6.4	13.8	18.3			
Crude birth rate	47.0	49.0	46.0			
Crude death rate	24.4	19.0	15.0			
Total fertility rate	6.6	6.9	6.7			
Neonatal mortality rate				40.0		
Post-neonatal mortality rate (per 1000)				60.0		
Infant mortality rate (per 1000)	155.0	137.0	115.0	100.0	98.0	
Under five mortality rate			191.0	155.0	161.0	
Life expectancy at birth both sexes	41.0	44.0	50.0			
Life expectancy at birth for male			49.0			
Life expectancy at birth for female			51.0			

Source: Health Statistics Abstract (1996) and Tanzania Demographic and Health Survey 1991/1992

Note: Figures are based on population census results of 1967, 1978 and 1988, on the Tanzania Demographic and Health Survey 1991/1992 for 1992, and on estimates of the Ministry of Health for 1994 and 1996.

Appendix III: The recurrent government health expenditures for dispensaries and health centres in 1995/1996 on the district level

Appendix IV: Logistic regression model of incidence of treatment with and without selecting the ill or injured

Behrman and Phananiramai or Pitt try to deal with the bias problems by structuring the sample differently (Appleton, 1995). In the regression for the incidence of treatment, only individuals who reported ill were included, being either “ill and treated” or “ill but not treated”. The results of this regression are repeated in the first column of Table 6. An alternative would be to run a regression where also healthy people are included, the dependent variable then being either “ill and treated” or “healthy or ill but not treated”. The results of this alternative regression are given in the second column of Table 6. The disadvantage of the latter regression is that no distinction can be made between healthiness or illness without treatment, the advantage is that the whole sample can be used.

Table 6: Logistic Regression Model of Incidence of Treatment

	When ill, treated versus not treated (1=treated)			Treated versus healthy or ill but not treated (1=treated)		
Number of cases	1940			13465		
-2 Log Likelihood Reduced Model	2535.9522			8281.4635		
-2 Log Likelihood Full Model	2485.8520			7840.7830		
Chi-Square (16)	50.1010			440.6810		
Significance Level	0.0000			0.0000		
Variable	Coefficient	Wald	Sig	Coefficient	Wald	Sig
ln(age)	-0.583	13.330	**	-1.471	252.414	**
ln (age squared)	0.120	12.110	**	0.326	251.308	**
sex (female=1)	-0.048	0.213		0.246	14.485	**
proportion women household	-0.904	3.500	+	-0.850	6.781	**
proportion boys household	-0.556	2.067		-0.908	13.698	**
proportion girls household	0.970	5.717	*	0.095	0.129	
ln (age household head)	-0.217	1.436		-0.114	0.944	
sex head (female=1)	0.348	4.299	*	0.441	19.274	**
education head (completed=1)	-0.037	0.048		0.145	2.031	
education head (completed=1)*poor	-0.035	0.028		-0.215	2.808	+
ln (consumption/month/capita)	0.179	8.589	**	0.279	54.202	**
ln (consumption/month/capita)*poor	-0.021	0.509		-0.006	0.105	
distance dispensary/health centre	-0.024	5.326	*	-0.014	3.589	+
distance dispensary/health centre*poor	0.025	5.836	*	0.016	4.785	*
ln (total government disp/hc expenditures)	-0.088	0.296		-0.380	13.079	**
% of non-wage in total	0.740	1.173		0.631	2.231	
constant	2.279	0.766		3.522	4.157	*

Note: Sig = significance level of: ** = between 0 and 1 %, * = between 1 and 5 % and + = between 5 and 10 %.

Most results of the two regressions are similar. The most striking is the switch in signs of the coefficients of the sex dummy and the education of the household head, while the quality variable has become very significant. The gender effect here is positive and strongly

significant. This means women seek more treatment, either because they are less healthy or because they have more chances of treatment when ill, compared to men. The coefficient of the education of the head of the family has turned positive, but is still insignificant. For the poor though, the negative effect has been reinforced and has become significant. The recurrent government expenditures, the proxy for quality of primary, public health care, has a very significant, negative coefficient. The more the government spends on dispensaries and health centres, the less people seek treatment. People with a higher quality health facility in the neighbourhood are either healthier or more ill without seeking treatment.

Overall, the alternative model performs well. The goodness of fit measure shows that the full model is significantly different of the reduced model. Also, the predictive power is higher than that of the first regression model, with 91 % of all observations predicted correctly versus 64 % of the first regression.

■

Table 5: Recurrent government health expenditures per district for health centres and dispensaries for 1995/96: total and per input (

REGION	REGION NAME	DISTRICT	DISTRICT NAME	TOTAL BUDGET	WAGE INPUT IN TOTAL BUDGET	WAGE SHARE IN TOTAL BUDGET (%)
01	DODOMA	11	KONDOA RURAL	127,125,300	68,267,600	54
		12	MPWAPWA RURAL	165,663,500	88,445,900	53
		13	DODOMA RURAL	290,586,100	186,435,700	64
02	ARUSHA	21	MONDULI RURAL	85,506,500	43,966,500	51
		22	ARUMERU RURAL	108,825,400	51,696,100	48
		25	BABATI RURAL	91,416,400	55,924,800	61
		26	HANANG RURAL	42,444,600	22,604,600	53
		27	MBULU RURAL	81,210,100	60,635,100	75
03	KILIMANJARO	31	ROMBO RURAL	133,761,700	90,117,700	67
		32	MWANGA RURAL	116,891,000	86,669,500	74
		33	SAME RURAL	114,835,600	75,552,100	66
		34	MOSHI RURAL	199,670,700	141,113,300	71
		35	HAI RURAL	170,178,200	91,533,400	54
04	TANGA	41	LUSHOTO RURAL	115,282,500	76,534,100	66
		43	MUHEZA RURAL	125,979,300	72,544,700	58
		46	HANDENI RURAL	106,537,900	60,571,700	57
05	MOROGORO	51	KILOSA RURAL	149,495,300	78,505,300	53
		52	MOROGORO RURAL	236,567,000	127,311,500	54
		53	KILOMBERO RURAL	100,610,000	59,183,100	59
		54	ULANGA RURAL	140,894,300	97,727,400	69
06	COAST	61	BAGAMOYO RURAL	123,250,300	70,433,200	57
		62	KIBAHA RURAL	72,310,400	46,164,400	64
		64	RUFIJI RURAL	116,626,700	67,187,400	58
		65	MAFIA RURAL	48,274,500	34,384,600	71
08	LINDI	81	KILWA RURAL	101,181,400	63,433,100	63
		82	LINDI RURAL	147,567,100	75,825,000	51
		83	NACHINGWEA RURAL	67,778,700	42,183,000	62
09	MTWARA	91	MTWARA RURAL	107,760,900	63,652,000	59
		92	NEWALA RURAL	130,790,900	95,129,500	73
		93	MASASI RURAL	139,089,900	93,492,500	67
10	RUVUMA	102	SONGEA RURAL	178,533,500	116,194,100	65
		103	MBINGA RURAL	145,571,900	78,193,500	54
11	IRINGA	111	IRINGA RURAL	159,747,500	69,796,100	44
		112	MUFINDI RURAL	123,457,500	51,172,100	41
		114	LUDEWA RURAL	104,788,100	50,256,400	48
		115	MAKETE RURAL	78,630,300	36,947,500	47

Table 5 continued: Recurrent government health expenditures per district for health centres and dispensaries for 1995/96: total and

REGION	REGION NAME	DISTRICT	DISTRICT NAME	TOTAL BUDGET	WAGE INPUT IN TOTAL BUDGET	WAGE SHARE IN TOTAL BUDGET (%)
12	MBEYA	121	CHUNYA RURAL	90,295,600	61,372,600	68
		122	MBEYA RURAL	139,729,900	79,750,000	57
		123	KYELA RURAL	63,979,100	41,979,500	66
		124	RUNGWE RURAL	121,533,000	73,076,900	60
		126	MBOZI RURAL	101,876,600	57,040,300	56
13	SINGIDA	131	IRAMBA	138,033,800	62,595,100	45
		132	SINGIDA RURAL	156,395,400	80,208,900	51
		133	MANYONI RURAL	127,842,300	64,892,600	51
14	TABORA	142	IGUNGA RURAL	100,707,300	65,826,900	65
		143	TABORA RURAL	141,061,400	69,246,800	49
		144	URAMBO RURAL	115,673,300	73,122,800	63

15	RUKWA	151	MPANDA RURAL	142,730,600	81,977,800	57
		152	SUMBAWANGA RURAL	146,659,400	82,831,300	56
16	KIGOMA	161	KIBONDO RURAL	164,193,600	81,884,100	50
		162	KASULU RURAL	146,725,400	69,950,700	48
17	SHINYANGA	171	BARIADI RURAL	108,341,400	58,842,000	54
		172	MASWA RURAL	90,035,400	53,617,200	60
		173	SHINYANGA RURAL	232,985,300	150,246,100	64
		174	KAHAMA RURAL	129,919,900	70,832,900	55
		176	MEATU RURAL	61,987,900	34,948,800	56
18	KAGERA	181	KARAGWE RURAL	129,316,500	84,998,700	66
		182	BUKOBA RURAL	126,532,000	74,243,200	59
		183	MULEBA RURAL	78,853,700	48,136,100	61
		184	BIHARAMULO RURAL	94,085,000	62,519,500	66
		185	NGARA RURAL	86,290,500	54,708,700	63
19	MWANZA	191	UKEREWE RURAL	129,852,400	82,724,800	64
		192	MAGU RURAL	153,353,800	102,485,300	67
		194	KWIMBA RURAL	218,850,700	135,573,300	62
		195	SENGEREMA RURAL	182,722,300	124,045,800	68
		196	GEITA RURAL	168,157,300	118,255,400	70
20	MARA	203	MUSOMA RURAL	141,664,700	86,897,600	61
		204	BUNDA RURAL	119,598,800	74,608,900	62

Source: Mchanganuo wa fedha za Ruzuku kwa halmashauri za miji na wilaya kwa mwaka 1995/96, Kimepigwa Chapa na Mpi
and Human Resource Development Survey 1993/1994, World Bank, Washington DC.

Notes: Only districts selected for the Human Resource Development Survey in rural areas are given here.
Wage input consists of personal emoluments. Nonwage input consists of driving vehicles, utensils, food and medicines
1 US $ was about 600 Tanzanian Shillings during this period.

(wage and nonwage) in Tanzanian Shillings

NONWAGE INPUT IN TOTAL BUDGET	NONWAGE SHARE IN TOTAL BUDGET (%)	N° OF HEALTH CENTRES AND DISPENSARIES	BUDGET PER HEALTH CENTRE OR DISPENSARY	WAGE INPUT PER HEALTH CENTRE OR DISPENSARY	NONWAGE INPUT PER HEALTH CENTRE OR DISPENSARY
58,857,700	46	47	2,704,794	1,452,502	1,252,291
77,217,600	47	45	3,681,411	1,965,464	1,715,947
104,150,400	36	65	4,470,555	2,868,242	1,602,314
41,540,000	49	26	3,288,712	1,691,019	1,597,692
57,129,300	52	36	3,022,928	1,436,003	1,586,925
35,491,600	39	23	3,974,626	2,431,513	1,543,113
19,840,000	47	16	2,652,788	1,412,788	1,240,000
20,575,000	25	29	2,800,348	2,090,866	709,483
43,644,000	33	13	10,289,362	6,932,131	3,357,231
30,221,500	26	31	3,770,677	2,795,790	974,887
39,283,500	34	38	3,021,989	1,988,213	1,033,776
58,557,400	29	28	7,131,096	5,039,761	2,091,336
78,644,800	46	35	4,862,234	2,615,240	2,246,994
38,748,400	34	36	3,202,292	2,125,947	1,076,344
53,434,600	42	53	2,376,968	1,368,768	1,008,200
45,966,200	43	34	3,133,468	1,781,521	1,351,947
70,990,000	47	59	2,533,819	1,330,598	1,203,220
109,255,500	46	78	3,032,910	1,632,199	1,400,712
41,426,900	41	26	3,869,615	2,276,273	1,593,342
43,166,900	31	28	5,031,939	3,490,264	1,541,675
52,817,100	43	38	3,243,429	1,853,505	1,389,924
26,146,000	36	13	5,562,338	3,551,108	2,011,231
49,439,300	42	41	2,844,554	1,638,717	1,205,837
13,889,900	29	09	5,363,833	3,820,511	1,543,322
37,748,300	37	28	3,613,621	2,265,468	1,348,154
71,742,100	49	26	5,675,658	2,916,346	2,759,312
25,595,700	38	18	3,765,483	2,343,500	1,421,983
44,108,900	41	32	3,367,528	1,989,125	1,378,403
35,661,400	27	46	2,843,280	2,068,033	775,248
45,597,400	33	43	3,234,649	2,174,244	1,060,405
62,339,400	35	51	3,500,657	2,278,316	1,222,341
67,378,400	46	48	3,032,748	1,629,031	1,403,717
89,951,400	56	41	3,896,280	1,702,344	2,193,937
72,285,400	59	40	3,086,438	1,279,303	1,807,135
54,531,700	52	17	6,164,006	2,956,259	3,207,747
41,682,800	53	27	2,912,233	1,368,426	1,543,807

l per input (wage and nonwage) in Tanzanian Shillings

NONWAGE INPUT IN TOTAL BUDGET	NONWAGE SHARE IN TOTAL BUDGET (%)	N° OF HEALTH CENTRES AND DISPENSARIES	BUDGET PER HEALTH CENTRE OR DISPENSARY	WAGE INPUT PER HEALTH CENTRE OR DISPENSARY	NONWAGE INPUT PER HEALTH CENTRE OR DISPENSARY
28,923,000	32	27	3,344,281	2,273,059	1,071,222
59,979,900	43	52	2,687,113	1,533,654	1,153,460
21,999,600	34	20	3,198,955	2,098,975	1,099,980
48,456,100	40	38	3,198,237	1,923,076	1,275,161
44,836,300	44	33	3,087,170	1,728,494	1,358,676
75,438,700	55	60	2,300,563	1,043,252	1,257,312
76,186,500	49	40	3,909,885	2,005,223	1,904,663
62,949,700	49	36	3,551,175	1,802,572	1,748,603
34,880,400	35	13	7,746,715	5,063,608	2,683,108
71,814,600	51	16	8,816,338	4,327,925	4,488,413
42,550,500	37	25	4,626,932	2,924,912	1,702,020

60,752,800	43	20	7,136,530	4,098,890	3,037,640
63,828,100	44	04	36,664,850	20,707,825	15,957,025
82,309,500	50	33	4,975,564	2,481,336	2,494,227
76,774,700	52	28	5,240,193	2,498,239	2,741,954
49,499,400	46	40	2,708,535	1,471,050	1,237,485
36,418,200	40	28	3,215,550	1,914,900	1,300,650
82,739,200	36	60	3,883,088	2,504,102	1,378,987
59,087,000	45	28	4,639,996	2,529,746	2,110,250
27,039,100	44	23	2,695,126	1,519,513	1,175,613
44,317,800	34	30	4,310,550	2,833,290	1,477,260
52,288,800	41	59	2,144,610	1,258,359	886,251
30,717,600	39	22	3,584,259	2,188,005	1,396,255
31,565,500	34	26	3,618,654	2,404,596	1,214,058
31,581,800	37	18	4,793,917	3,039,372	1,754,544
47,127,600	36	28	4,637,586	2,954,457	1,683,129
50,868,500	33	44	3,485,314	2,329,211	1,156,102
83,277,400	38	59	3,709,334	2,297,853	1,411,481
58,676,500	32	35	5,220,637	3,544,166	1,676,471
49,901,900	30	48	3,503,277	2,463,654	1,039,623
54,767,100	39	37	3,828,776	2,348,584	1,480,192
44,989,900	38	23	5,199,948	3,243,865	1,956,083

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